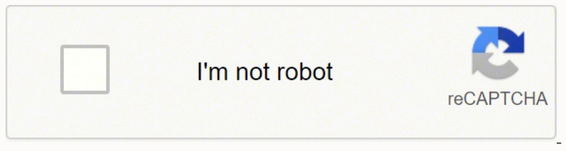

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Data mining techniques classification

Skip to Main Content Organizations have access to more data now than they have ever had before. However, making sense of the huge volumes of structured and unstructured data to implement organization-wide improvements can be extremely challenging because of the sheer amount of information. If not properly addressed, this challenge can minimize the benefits of all the data.Data mining is the process by which organizations detect patterns in data for insights relevant to their business needs. It's essential for both business intelligence and data science. There are many data mining techniques organizations can use to turn raw data into actionable insights. These involve everything from cutting-edge artificial Intelligence to the basics of data preparation, which are both key for maximizing the value of data investments. Data cleaning and preparationTracking patternsClassificationAssociationOutlier detectionClusteringRegressionPredictionSequential patternsDecision treesStatistical techniquesVisualizationNeural networksData warehousingLong-term memory processingMachine learning and artificial intelligence1. Data cleaning and preparationData cleaning and preparation is a vital part of the data mining process. Raw data must be cleansed and formatted to be useful in different analytic methods. Data cleaning and preparation includes different elements of data modeling, transformation, data migration, ETL, ELT, data integration, and aggregation. It's a necessary step for understanding the basic features and attributes of data to determine its best use. The business value of data cleaning and preparation is self-evident. Without this first step, data is either meaningless to an organization or unreliable due to its quality. Companies must be able to trust their data, the results of its analytics, and the action created from those results.These steps are also necessary for data quality and proper data governance. 2. Tracking patterns Tracking patterns is a fundamental data mining technique. It involves identifying and monitoring trends or patterns in data to make intelligent inferences about business outcomes. Once an organization identifies a trend in sales data, for example, there's a basis for taking action to capitalize on that insight. If it's determined that a certain product is selling more than others for a particular demographic, an organization can use this knowledge to create similar products or services, or simply better stock the original product for this demographic.3. ClassificationClassification data mining techniques involve analyzing the various attributes associated with different types of data. Once organizations identify the main characteristics of these data types, organizations can categorize or classify related data. Doing so is critical for identifying, for example, personally identifiable information organizations may want to protect or redact from documents.4. AssociationAssociation is a data mining technique related to statistics. It indicates that certain data (or events found in data) are linked to other data or data-driven events. It is similar to the notion of co-occurrence in machine learning, in which the likelihood of one data-driven event is indicated by the presence of another. The statistical concept of correlation is also similar to the notion of association. This means that the analysis of data shows that there is a relationship between two data events: such as the fact that the purchase of hamburgers is frequently accompanied by that of French fries. 5. Outlier detectionOutlier detection determines any anomalies in datasets. Once organizations find aberrations in their data, it becomes easier to understand why these anomalies happen and prepare for any future occurrences to best achieve business objectives. For instance, if there's a spike in the usage of transactional systems for credit cards at a certain time of day, organizations can capitalize on this information by figuring out why it's happening to optimize their sales during the rest of the day. 6. ClusteringClustering is an analytics technique that relies on visual approaches to understanding data. Clustering mechanisms use graphics to show where the distribution of data is in relation to different types of metrics. Clustering techniques also use different colors to show the distribution of data. Graph approaches are ideal for using cluster analytics. With graphs and clustering in particular, users can visually see how data is distributed to identify trends that are relevant to their business objectives. 7. RegressionRegression techniques are useful for identifying the nature of the relationship between variables in a dataset. Those relationships could be causal in some instances, or just simply correlate in others. Regression is a straightforward white box technique that clearly reveals how variables are related. Regression techniques are used in aspects of forecasting and data modeling.8. PredictionPrediction is a very powerful aspect of data mining that represents one of four branches of analytics. Predictive analytics use patterns found in current or historical data to extend them into the future. Thus, it gives organizations insight into what trends will happen next in their data. There are several different approaches to using predictive analytics. Some of the more advanced involve aspects of machine learning and artificial intelligence. However, predictive analytics doesn't necessarily depend on these techniques —it can also be facilitated with more straightforward algorithms.Go from simple metrics to full fledged analytics with our Guide to Product IntelligenceGet the ebook9. Sequential patternsThis data mining technique focuses on uncovering a series of events that takes place in sequence. It's particularly useful for data mining transactional data. For instance, this technique can reveal what items of clothing customers are more likely to buy after an initial purchase of say, a pair of shoes. Understanding sequential patterns can help organizations recommend additional items to customers to spur sales. 10. Decision treesDecision trees are a specific type of predictive model that lets organizations effectively mine data. Technically, a decision tree is part of machine learning, but it is more popularly known as a white box machine learning technique because of its extremely straightforward nature. A decision tree enables users to clearly understand how the data inputs affect the outputs. When various decision tree models are combined they create predictive analytics models known as a random forest. Complicated random forest models are considered black box machine learning techniques, because it's not always easy to understand their outputs based on their inputs. In most cases, however, this basic form of ensemble modeling is more accurate than using decision trees on their own.11. Statistical techniquesStatistical techniques are at the core of most analytics involved in the data mining process. The different analytics models are based on statistical concepts, which output numerical values that are applicable to specific business objectives. For instance, neural networks use complex statistics based on different weights and measures to determine if a picture is a dog or a cat in image recognition systems. Statistical models represent one of two main branches of artificial intelligence. The models for some statistical techniques are static, while others involving machine learning get better with time.12. VisualizationData visualizations are another important element of data mining. They grant users insight into data based on sensory perceptions that people can see. Today's data visualizations are dynamic, useful for streaming data in real-time, and characterized by different colors that reveal different trends and patterns in data. Dashboards are a powerful way to use data visualizations to uncover data mining insights. Organizations can base dashboards on different metrics and use visualizations to visually highlight patterns in data, instead of simply using numerical outputs of statistical models.13. Neural networksA neural network is a specific type of machine learning model that is often used with AI and deep learning. Named after the fact that they have different layers which resemble the way neurons work in the human brain, neural networks are one of the more accurate machine learning models used today.Although a neural network can be a powerful tool in data mining, organizations should take caution when using it: some of these neural network models are incredibly complex, which makes it difficult to understand how a neural network determined an output.14. Data warehousingData warehousing is an important part of the data mining process. Traditionally, data warehousing involved storing structured data in relational database management systems so it could be analyzed for business intelligence, reporting, and basic dashboarding capabilities. Today, there are cloud data warehouses and data warehouses in semi-structured and unstructured data stores like Hadoop. While data warehouses were traditionally used for historic data, many modern approaches can provide an in-depth, real-time analysis of data.15. Long-term memory processingLong term memory processing refers to the ability to analyze data over extended periods of time. The historic data stored in data warehouses is useful for this purpose. When an organization can perform analytics on an extended period of time, it's able to identify patterns that otherwise might be too subtle to detect. For example, by analyzing attrition over a period of several years, an organization may find subtle clues that could lead to reducing churn in finance. 16. Machine learning and artificial intelligenceMachine learning and artificial intelligence (AI) represent some of the most advanced developments in data mining. Advanced forms of machine learning like deep learning offer highly accurate predictions when working with data at scale. Consequently, they're useful for processing data in AI deployments like computer vision, speech recognition, or sophisticated text analytics using Natural Language Processing. These data mining techniques are good for determining value from semi-structured and unstructured data.Optimization with data mining tools With a wide range of techniques to use during data mining, it's essential to have the appropriate tools to best optimize your analytics. Typically, these techniques require several different tools or a tool with comprehensive capabilities for proper execution. Although organizations can use data science tools such as R, Python, or Knime for machine learning analytics, it's important to ensure compliance and proper data lineage with a data governance tool. Additionally, organizations will need to work with repositories like cloud data stores in order to perform analytics as well as dashboards and data visualizations to provide business users with the information they need to understand analytics. Tools with all of these features are available, but it's important to find one or multiple that fit your business needs.The cloud and the future of data miningCloud computing technologies have had a tremendous impact on the growth of data mining. Cloud technologies are well suited for the high speed, huge quantities of semi-structured and unstructured data most organizations are dealing with today. The cloud's elastic resources easily scale to meet these big data demands. Consequently, because the cloud can hold more data of various formats, it requires more tools for data mining to turn that data into insight. Additionally, advanced forms of data mining like AI and machine learning are offered as services in the cloud.Future developments in cloud computing will surely continue to fuel the need for more effective data mining tools. Within the next five years, AI and machine learning will become even more commonplace than they are today. With the growth rate of data increasing exponentially everyday, the cloud is the most appropriate place to both store and process data for business value. Consequently, data mining approaches will rely even more on the cloud than they currently do. Getting started with data miningOrganizations can get started with data mining by accessing the necessary tools. Because the data mining process starts right after data ingestion, it's critical to find data preparation tools that support different data structures necessary for data mining analytics. Organizations will also want to classify data in order to explore it with the numerous techniques discussed above. Modern forms of data warehousing are useful in this regard, as are various predictive and machine learning/AI techniques.Organizations will benefit from using a single tool for all of these different data mining techniques. By having one place to perform these different data mining techniques, companies can reinforce the data quality and data governance measures required for trusted data. As a comprehensive suite of apps that focuses on data integration and data integrity, Talend Data Fabric streamlines data mining to help businesses gain the value most from their data. Try Talend Data Fabric today to reveal your business's data-driven insights.

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